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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,856	12/16/2003	Arie Jeffrey Den Boef	081468-0307281	3160
909	7590	08/05/2005	EXAMINER	
PILLSBURY WINTHROP SHAW PITTMAN, LLP			NGUYEN, HUNG	
P.O. BOX 10500			ART UNIT	
MCLEAN, VA 22102			PAPER NUMBER	
			2851	

DATE MAILED: 08/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/735,856

Applicant(s)

DEN BOEF ET AL.

Examiner

Hung Henry V. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/19/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 5, 7, 15, 22, 24, and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claims 5, 7, 15, 22, 24, and 31, the recitation of “ wherein the alignment system is arranged to compute information about a distance between (1) the measure intensities and (2) corresponding values based on the modelthat minimized the distance” is vague and indefinite (for example, see claim 5) . It is normally understanding that “distance” is the degree or amount of separation between two points, lines, surfaces, or objects. Therefore, it is not clearly understood how to compute “the distance” between two values/intensities/properties as claimed. Please explain.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

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subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 11-17, 18-19, 28-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Ina et al (U.S.Pat. 6,559,924).

With respect to claims 1-2, 11-13 and 18-19, 28-29, Ina et al discloses an exposure apparatus and corresponding apparatus for transferring a pattern formed on a reticle (12) onto a substrate (W) and comprising all of the limitations of the instant claims including an alignment system (63-66) configured to obtain positional information from light affected by the substrate (see figure 3), to determine the position of an alignment mark (AM) relative to the reticle based on the positional information, and to control a relative positioning of the reticle and the substrate based on the determined position. Ina further discloses the alignment system being configured to obtain position invariant information from the light affected by the substrate and to determine based on the positional invariant information (see col.10, lines 16-41), a correction to a determination of a position of an alignment mark of the substrate (see col.11, lines 17-35).

As to claim 2, Ina et al teaches the alignment system is configured to measure a phase value of light diffracted by the alignment mark and to determine the position of the alignment mark based on the phase value (see col.11, lines 35-36).

As to claims 14-17 and 30-34, Ina et al teaches the alignment system including a model equation/Maxwell's equation, describing at least one positional dependent optical effect of the alignment mark (see col.12, lines 23-32).

As to claims 13 and claim 29, Ina et al further teaches the exposure apparatus having neural network configured to determine the correction (see figure 17).

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5. Claims 14-16, and 30-32, 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Koren et al (U.S. 2004/0130690 A1).

With respect to claim 14-16 and 30-32, and 34, Koren et al discloses a lithographic projection apparatus and corresponding method, comprising all of the limitations of the instant claims such as: a support structure (MA) for supporting a patterning structure (M) configured to pattern a beam of radiation according to a predetermined pattern; a substrate holder (WH) for holding a substrate (W) having an alignment structure (P1, P2) and an alignment system (AS) configured to measure properties of light affected by the alignment structure, to determine a position of the alignment structure relative to the patterning structure based on the measured properties and to control a relative positioning of the patterning structure and the substrate based on the determined position (see section [0089]; and the alignment system includes a model/equation, describing the physical properties of the alignment structure (see sections [0105]- [0108]) and wherein the alignment system is arranged to estimate a value of a parameter of the model equations corresponding to at least one of the measured properties and to determine a correction to the determined position based on the estimate value (see sections [0114], [0117]).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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7. Claims 3-10 and 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ina et al (U.S.Pat. 6,559,924) in view of Nomura et al (U.S.Pat. 5,969,428).

With respect to claims 3-10 and 20-27, Ina et al discloses an exposure apparatus having an alignment system comprising substantially all of the limitations of the instant claims as discussed above including Maxwell's equation, describing at least one positional dependent optical effect of the alignment mark. Ina et al does not expressly disclose alignment system having a model describing at least one position-dependent optical effect of the alignment mark to estimate a value of a parameter of the model corresponding to at least one of the measured intensities. Nomura et al discloses an alignment system where intensities of a physical equation of an alignment mark are estimated from the reflected light and used to determine the position of the alignment mark (see col.18, line 50 thru col.19, line 10). In view of such teachings, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Ina and Nomura to obtain the invention as specified in the instant claims of the present invention. It would have been obvious to a skilled artisan to measure the intensities of different diffraction peaks of light diffracted from the alignment mark of Ina, as taught by Nomura for the purpose of determining the accurate position of the alignment mark and whereby the alignment of the reticle and the substrate is greatly improved.

8. Claims 17 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koren et al (U.S. 2004/0130690 A1 in view of Chen et al (U.S.Pat. 6,064,486).

As to claims 17 and 33, Koren discloses substantially all of the limitations of the instant claims as discussed except for the model describing geometrical properties of the alignment

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mark. Chen et al discloses an exposure apparatus and method detecting a position of an alignment mark formed on a substrate by producing an alignment signal model which relates shape parameters of the alignment mark (for example, see equations.(1) and (2)). It would have been obvious to a skilled artisan to incorporate the teachings of Koren and Chen to obtain the invention as specified in claims 17 and 33 of the present invention. It would have been obvious to utilize the model relating shape parameters of the alignment marks as taught by Chen into the apparatus/method of Koren for the purpose of detecting the position of the alignment mark and improving the accuracy of the alignment system.

Prior Art Made of Record

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Maeda (U.S.Pat. 6,481,003) and Nakazawa et al (U.S.Pat. 4,103,998) are cited for their teachings of alignment systems for measuring properties of light affected by the alignment marks formed on the substrate for detecting the position of the alignment marks.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Henry V. Nguyen whose telephone number is 571-272-2124. The examiner can normally be reached on Monday-Friday (First Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on 571-272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Hung Henry V Nguyen
Primary Examiner
Art Unit 2851

hvn
5/25/05